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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Forest Insect Laboratory
Coeur d'Alene, Idaho

Project Insectary Activities

Date March 2, 1942

Author Henry J. Rust
Senior Scientific Aide

TITLE

INSECT REARING EXPERIMENTS FOREST INSECT LABORATORY COEUR D'ALENE, IDAHO JANUARY 1 TO DECEMBER 31, 1941

SUBJECT—

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March 10, 1942

To: F. C. Craighead, in Charge, Forest Insect Investigations

From: James C. Evenden, Box 630, Coeur d'Alene, Idaho

Subject: Report on Insect-rearing Experiments of the Coeur d'Alene Laboratory, Calendar Year 1941.

I am enclosing copy of a report by Mr. Rust covering the rearing experiments conducted at the Coeur d'Alene Forest Insect Laboratory during the calendar year 1941. A copy is being routed through the eastern laboratories, and copies are also being sent to Berkeley and Portland.

James C. Evenden

Enclosure

INSECT REARING EXPERIMENTS
FOREST INSECT LABORATORY
COEUR D'ALENE, IDAHO
JANUARY 1 TO DECEMBER 31, 1941

The following report covers the insect-rearing operations at the Coeur d'Alene Laboratory insectary from January 1 to December 31, 1941. Nearly all of the material overwintered 1940-41 consisted of sections of ponderosa pine infested by Melanophila sp. from the Salmon River area near Riggins, Idaho. These sections, seventeen in number, cut from five felled and two standing trees, contained a total of 63-3/4 square feet of bark surface and were confined in six separate rearing cages and two galvanized insect-rearing cans. Two cages containing small infested limbs cut from the ponderosa pine felled May 16, 1940, were also overwintered 1940-41. As the Melanophila californica and gentilis problem had become the main rearing project, all available space and rearing containers were devoted to this project for the 1941 season and for overwintering 1941-42. In addition to the rearing containers confined in the insectary building, a large double compartment cage and two small cages were constructed outside near the insectary. These cages were to be used to test out the possibilities of Melanophila californica attacking slash under caged conditions. The following list gives the order, host and collection locality of the 1940-41 overwintered material and rearings conducted during the season of 1941:

Order and insect	Host	Locality
COLEOPTERA		
Melanophila californica V.D.	Pinus ponderosa	Riggins, Shoup & Spalding, Ida.
Melanophila gentilis Lec.	" "	do.
Monochamus maculosus Hald.	" "	Riggins, Ida.
Acanthocinus obliquus Lec.	" "	Riggins & Shoup, Ida.
Gelus californicus Lec.	" "	" " " "
Hypophloeus sp. near substriatus Lec.	" "	" " " "
Othynius lugubris Horn.	" "	" " " "
Temnochila virescens var chlorodia (Mann.)	" "	" " " "
Callidium antennatum Newm.	" "	" " " "
Chrysobothris dolata Horn.	" "	" " " "
Platydema sp.	" "	" " " "
Pissodes engelmanni Hopk.	Engelmann spruce	Limestone, Mont.
Melanophila drummondi Kirby	Douglas fir	McCall, Idaho
HYMENOPTERA		
Atanycolus montivagus (Cress.)	Melanophila gentilis & californica	Riggins & Shoup, Ida.
Ichneumon sp.	Melanophila drummondi	McCall, Idaho
Xorides insularis (Cress.)	" "	" "
Odontaulacus rufitarsus (Cress.)	" "	" "
Rhodites sp.	Wild rose root gall	St. Regis, Montana
Tetrastichus rosae Ashm.	" " " "	" " "
Callimome flavicornum O.S.	" " " "	" " "
Orthopelma sp.	" " " "	" " "

Order and insect	Host	Locality
DIPTERA		
Zabrachia polita Coq.	Ponderosa pine	Riggins, Ida.
Pseudatrichia prob. n. sp.	" "	" "
Andrenosoma fulvicauda (Say)	" "	" "
HEMIPTERA		
Aradus n. p.	" "	" "

Detailed results of the various rearing experiments conducted during the season follow under their respective headings.

COLEOPTERA

Melanophila Project 1941

While both Melanophila californica and gentilis were to be considered in the rearing project, a greater concentration of time and effort was to be devoted to the former species. The primary object of the experiment was to determine if existing differences of these two species establish them as separate species or if their characters were associated with the type of host material in which they breed. Also to ascertain if M. californica would attack and successfully rear broods in slash under caged conditions.

Previous rearings at the Coeur d'Alene Laboratory insectary during 1939 and 1940 from 15 four-foot sections cut from infested standing ponderosa pine trees in the Riggins, Idaho, area gave only the one species, Melanophila californica. On May 16, 1940, four uninfested ponderosa pine trees were felled in the vicinity of Riggins, Idaho, and

left undisturbed on the ground until July 24, 1940, at which time five four-foot sections were cut from the felled trees and brought to the Coeur d'Alene insectary and placed in rearing cages. On July 30, 1941, one adult Melanophila gentilis emerged from one of the caged sections and during August seven more adults were secured from the same material, the rest of the brood remaining in cells in the outer bark and were overwintered during 1940-41.

For the principal rearing part of the project a double compartment wire-screened cage was constructed near the insectary during the month of April 1941. This cage measured eight feet long, six feet high, and four feet wide, with a screened partition in the middle. One section of the cage was to hold infested sections of ponderosa pine from the Riggins area along with green sections for attack, and the other compartment to hold only freshly cut green sections for attack by Melanophila californica adults reared in the insectary and placed in the cage daily. A small ponderosa pine tree was planted in the ground for each compartment, the wire screen floor being built around the base of each tree. As the rearings from the 1940 slash gave indications of a mixed or entire emergence of M. gentilis, additional infested material from standing trees was secured from the Riggins area on May 2 and June 30, 1941, to assure a plentiful supply of adult M. californica to carry on the rearing experiment in the outside cages. Three sections of the May 2 collection were placed in one of the compartments of the outside cage designated as M-A along with sections of green uninfested ponderosa pine. May 20 emergence of M. gentilis

began in compartment M-A from the sections cut from standing trees on May 2. On May 29 eight M. gentilis adults were observed flying about in the cage, with some feeding on the foliage of the enclosed tree. This emergence changed the plan of using this compartment for securing attacks by M. californica. On June 2, emergence of M. californica began in cage M-A, which made possible a combined attack by the two species. Fresh ponderosa pine foliage in addition to the enclosed tree was provided daily during the period of emergence, and considerable feeding by the adults was noted. Owing to a long spell of cool and rainy weather during May and June no emergence of M. californica was secured from the rearing containers in the insectary until June 17, starting with one or two adults daily and not becoming general until the middle of July, when air temperatures reached 100° F. and over for a few days. As fast as adults were secured they were released into cage M-B containing freshly cut sections of green ponderosa pine and a daily supply of fresh foliage. During the period June 23 to July 20, 161 adult M. californica emerged in the insectary and were liberated in cage M-B. As many more adults were becoming available, two extra cages were constructed, each to hold a single section of freshly cut green ponderosa pine. These cages were suspended from a pole attached to two trees near the insectary. Newly emerged M. californica adults were liberated in each of these cages, 47 in one and 53 in the other; these cages were also daily supplied with fresh foliage. Visible activity of M. californica ceased on August 5 in cage M-B. A few M. gentilis were still active in cage M-A until August 10. All

activity in the two smaller outside cages had ceased by August 1. An inextensive examination of two sections from cage M-B (M. californica compartment) was made on September 5, 1941. From an area 6 inches square four larval mines were located entirely in the cambium layer, leaving no scar either on the surface of the wood or the inner bark. The individual larval mines measured 3/8, 5/16, 3/16 and 5/16 inches in length. Two small larvae were collected from the mines, the remaining two were damaged and lost in removing the outer bark. The two collected measured in length 1½ mm. and 1-2/3 mm. respectively. A small area of bark surface on one section from cage M-A (M. gentilis and californica) was examined on October 10, 1941. This stick showed a fairly heavy infestation by M. gentilis, the larvae of this species having attained a length of 15 mm. An examination on October 10, 1941, of the section contained in one of the smaller outside cages in which only M. californica had been liberated showed that the section had been attacked. Two larvae were collected from the cambium layer on a small area. These larvae each measured 2 mm. in length. All of the sections supplied for attack in the outside cages were removed on October 10, 1941, and placed in rearing cages in the insectary for overwintering 1941-42.

The results of the total emergence of M. gentilis and californica from both the slash and standing trees are as follows:

Emergence 1941 11 sections slash 16 sections standing trees	Slash							Standing trees									Totals 145½ sq.ft. bark surface
	Cages					Cans		Cages				Cans					
	1:	2:	3:	4:	8:	4:	7:	5:	6:	9:	10:	1:	2:	3:	5:	6:	
M. gentilis	62:	2:	53:	0:	20:	54:	21:	8 :	0:	0:	0:	6:	0:	2:	5:	4:	237
M. californica	0:	3:	11:	12:	2:	3:	18:	123:	66:	41:	18:	47:	35:	23:	42:	9:	453

The above table shows the emergence secured from 27 sections of infested ponderosa pine confined in sixteen rearing containers. Ten of the rearings gave both species of Melanophila, one no M. californica and five no M. gentilis. The maximum emergence from slash was recorded for cage No. 3. This infested material was cut from a tree felled near Riggins, Idaho, May 16, 1940, and left intact and not covered with brush. The minimum emergence from slash was secured from cage No. 2. The infested material in this cage consisted of three small sections cut from one of the trees that was felled near Riggins, Idaho, on May 16, 1940, limbed, topped, and the bole covered with brush. These sections were placed in rearing on July 26, 1940. On June 26, 1941, Acanthocinus obliquus began to emerge, followed a few days later by Monochamus maculosus, and a number of associated insects. The large number of wood borers present during the Melanophila larval feeding period destroyed so much of the food content that the small emergence of M. californica and M. gentilis could be readily accounted for. The maximum emergence secured from standing trees was recorded for cage No. 5. The infested material in this cage consisted of one section cut from a small standing tree in the Riggins, Idaho, area that had been

mechanically injured by road construction work. The minimum emergence from standing trees was secured from can No. 6. This infested material consisted of one section cut from a small tree from among a group of infested ponderosa pine in the Riggins, Idaho, area. The above tabulation also shows the emergence of M. gentilis in slash sections to be practically five times more than that for M. californica. In sections from standing trees the emergence of M. californica was nearly 16 times that of M. gentilis. Emergence of M. gentilis from sections cut from slash began on July 15, 1941, ending July 30, 1941, eighty-six percent of this emergence occurring within a range of eight days. From sections cut from standing trees during 1941 the emergence was much less and quite variable, ranging over a period of 60 days, from May 25 to August 1, 1941.

Emergence of M. californica from sections cut from slash began on July 17, 1941, ending August 6, 1941. Thirty-one percent of this emergence occurred within a range of eight days. The greatest emergence was secured from sections cut from standing trees during 1940-41, also the largest number of adults per square foot of bark surface. Of the total of 453 Melanophila californica adults reared during 1941, 261 were used in the experiment in the outside cages, the balance along with the associate emergence of M. gentilis were pinned and labelled for study purposes. A large series of this associated emergence of the two species was sent to Washington, D. C.

SUMMARY

The first indication of a severe infestation in the ponderosa pine stands in the Salmon River region near Riggins, Idaho, was reported by Mr. T. T. Terrell of the Coeur d'Alene Laboratory personnel in 1938. An examination of the infested trees showed the work to be that of a flathead borer. Rearing of infested material from standing trees began in November 1938 and emergence from this infested material during July and August 1939 proved the borer to be Melanophila californica V.D. On May 16, 1940, Mr. Terrell felled four green uninfested ponderosa pine in the Riggins, Idaho, area. Two of these trees were limbed, topped, and brush piled over the bole; the remaining two were left intact. On July 26, 1940, sections were cut from these felled trees and placed in rearing at the Coeur d'Alene Laboratory insectary. On July 31, 1940, and during August a few adults of Melanophila gentilis emerged from sections cut from tree not limbed or covered with brush. The balance of the larvae remained in pupal cells in the outer bark until July 1941, at which time emergence of both M. gentilis and californica began from the sections cut from the trees felled May 16, 1940. From the 27 sections of infested ponderosa pine confined in 16 rearing containers in the insectary, five of the rearings from slash and five from standing trees gave both species of Melanophila, one from slash no californica, one from slash no gentilis, and four from standing trees no gentilis. All the material from standing trees gave an emergence of M. californica. The emergence of M. gentilis in slash was five times as heavy as for californica.

while from sections from standing trees the emergence of californica was nearly 16 times that of M. gentilis. The emergence of both species was considerably delayed in the insectary owing to a long cool wet spell during May and June. Of the total rearings of M. californica 60 percent were used in the Melanophila project experiment; the balance along with the associated emergence of M. gentilis were reserved for study purposes. A large series of each species in association from both slash and standing trees were sent to Washington, D. C., and both species were found to retain their characteristics as to separate species. Knowing the date on which the green trees were felled near Riggins, Idaho, and the date of emergence from this material, it was found that some M. gentilis can develop and emerge in less than three months and that both species in association can develop to maturity in slash and emerge within one year's time. The rearing experiment also showed that Melanophila californica and gentilis will attack slash under caged conditions. Whether or not the broods from the slash will mature and emerge will not be known until July or August 1942.

COLEOPTERA

Cerambycidae - Wood Borers

Monochamus maculosus Hald. Three infested ponderosa pine sections cut July 26, 1940, from a tree felled, topped, limbed, and the bole covered with brush near Riggins, Idaho, on May 16, 1940, were placed in rearing in cage No. 2 on July 26, 1940. From these small

sections 23 adult Monochamus maculosus emerged over a period of thirteen days during July, at which time the daily average maximum temperature reached 90° F. During the larval feeding period of these wood borers a large amount of the food supply necessary for the developing Melanophila larvae present was destroyed. This condition augmented by other wood-boring larvae in this material no doubt brought about the very low emergence of Melanophila gentilis and californica in cage No. 2 which was recorded as giving the minimum emergence of the two species of Melanophila for the entire 27 sections used in the rearing experiment.

Acanthocinus obliquus Lec. - From the same infested sections of ponderosa pine confined in rearing cage No. 2 and overwintered 1940-41 and from which the Monochamus maculosus emergence was recorded, an emergence of nine Acanthocinus obliquus adults was also secured, the emergence period extending over a period of 14 days - June 26 to July 11, 1941. The additional feeding activities of the larvae of this species of wood borer in association with the Monochamus maculosus probably considerably decreased the available food supply required by the developing Melanophila larvae present in the infested material. Acanthocinus obliquus adults were also reared from a section of Melanophila-infested standing ponderosa pine cut near Shoup, Idaho, on February 19, 1941, emergence occurring during August 1941.

Callidium antennatum Newn. - Adults of this species of wood borer were reared from some small ponderosa pine limbs cut from one of the trees that had been felled May 16, 1940, in the Riggins, Idaho, area. Emergence occurred between May 19 and June 5, 1941, or practically one year from date of attack.

COLEOPTERA

Buprestidae - Wood Borers

Chrysobothris dolata Horn - This species of flathead borer was reared from seven sections of ponderosa pine infested by Melanophila gentilis and californica and from small limbs cut from infested slash in the Riggins, Idaho, area. Six of the sections were from slash and one from a standing infested tree. The total emergence from the infested sections occurred during a period of eight days, August 11 to 18 inclusive. Those from the slash had a life cycle of fifteen months or slightly less, depending on the time of attack. The ponderosa pine limbs attacked by this species were small, averaging approximately 1½ inches in diameter. While these limbs had become extremely dry under caged conditions, emergence from this material was heavier than from the larger sections but was prolonged over a longer period of time. Adults secured from the sections were quite variable in size; those from the small limbs showed very little variation.

Melanophila drummondi Kirby - A number of dying Douglas fir varying from 8 to 30 inches d.b.h. and growing near the shore of Payette Lake near McCall, Idaho, were examined June 29, 1941, by Mr. T. T. Terrell. The trees were found to be heavily infested by a small species of flathead wood borer. A quantity of the thick infested bark was brought to the Coeur d'Alene Laboratory insectary June 30, 1941, and placed in rearing containers. A number of adult Melanophila drummondi Kirby were secured from the material as well as three species of Hymenopterous parasites.

COLEOPTERA

Miscellaneous species reared from Melanophila-infested ponderosa pine

Predators

Temnochila virescens var chlorida (Mann.). The green trogositid, T. virescens var chlorida, was reared from 11 of the 27 sections used for the Melanophila project. The emergence of this species extended over a period of 90 days, May 23 to August 24, 1941, seventy percent occurring during August. Fifty-four percent of the reared adults were recorded from sections cut from slash; the balance, 46 percent, from sections cut from infested standing trees. Four adults were the maximum from any one rearing container. While in the larval form, this predator no doubt destroyed many of the Melanophila larvae or pupae present in the infested material.

Othynius lugubris Horn. This species was reared only from Melanophila-infested sections cut from standing trees during May and June 1941. Its known range in the Salmon River region extends from Shoup, Idaho, to Spalding, Idaho, the same range as known for Melanophila californica. A large percent of the larvae of O. lugubris while still in an immature stage began to emerge from between the bark and wood of the infested sections shortly after they were placed in rearing containers, or when the bark began to loosen from the wood. Adults were reared from three different containers. Their value as predators was not determined during the Melanophila study, owing to the numerous associated insects present.

COLEOPTERA

Miscellaneous associated species

Gelus californicus Lec. and Hypophloeus sp. near substriatus Lec. Adults of these two species were reared from the infested ponderosa pine sections cut from a felled tree near Riggins, Idaho, and placed in cage No. 2, which also gave a very heavy emergence of wood borers. Emergence of Gelus californicus occurred during the latter part of July; 26 adults were recorded. The Hypophloeus emergence began on July 9 and ended July 26; a total of 17 adults of this species were secured. This was the only infested material from the Riggins area from which these two species were reared.

Platydema sp. Adults of this species were reared from only one of the 27 sections of infested ponderosa pine used in the Melanophila study during 1940-41. This section was cut from a large standing tree near Riggins, Idaho, on May 2, 1941, emergence occurring during May 1941.

HYMENOPTERA

Parasites

Atanycolus montivagus (Cress.). Only a few adults of this species were reared from the Melanophila-infested ponderosa pine during the 1941 season. Those that emerged were from sections cut during February and May 1941 from standing infested trees near Riggins and Shoup, Idaho.

Xorides insularis (Cress.), Odontaulacus rufitarsus (Cress.) and an Ichneumon sp. These three species were reared from Douglas fir bark heavily infested by Melanophila drummondi Kirby collected from a group of infested trees near McCall, Idaho. Emergence of all three species occurred during July 1941.

HYMENOPTERA

Rose root gall insects

Rhodites sp. Several large-sized wild rose galls were collected near St. Regis, Montana, on August 21, 1940, and forwarded to the Coeur d'Alene Laboratory and placed in rearing. On May 17, 1941, emergence of adult rose gall wasps began, ending on June 2. During this period 257 adults were recorded. This insect was determined in Washington, D. C., as Rhodites sp.

Tetrastichus rosae Ashm., Callimome flavicoxum O.S. and Orthopelma sp. These three species of Hymenoptera parasites emerged during May 1941 from the rose root galls collected near St. Regis, Mont., on August 21, 1940, and have been considered as probable parasites of the gall wasp Rhodites sp.

DIPTERA

Zabrachia polita Coq., Pseudatrichia prob. n. sp. and Andrenosoma fulvicauda (Say). These three species of Diptera were the only representatives of the order reared during the 1941 season from Melanophila-infested ponderosa pine. All three of the species emerged from the infested sections of ponderosa pine cut from slash felled near Riggins, Idaho, May 16, 1940, and placed in rearing in cage No. 2. Emergence occurred early in July 1941 and consisted of 34 Zabrachia polita adults and one adult of each of the other two species. The emergence of these Diptera specimens along with all the other species listed from cage No. 2 gave this material a very extensive insect association.

HEMIPTERA

Aradus n. sp. This was the only specimen of Hemiptera reared from Melanophila-infested ponderosa pine during the 1941 season. Emergence occurred July 8 from material cut during May 1941 from a standing tree.